

CLAIMS

What is claimed is:

5

1. An apparatus bodies comprising:

a plurality of syringe bodies, each comprising a barrel; and,

a belt fixedly connected to each of said plurality of syringe bodies, wherein said plurality of syringe bodies are positioned in a predetermined orientation.

10

2. An apparatus as recited in Claim 1, wherein dispensing ends of the barrels of the plurality of syringe bodies extend in a common direction in said predetermined orientation.

3. An apparatus as recited in Claim 1, wherein said belt defines a predetermined spacing between adjacent ones of said plurality of syringe bodies.

4. An apparatus as recited in Claim 3, wherein said predetermined spacing is substantially the same between each pair of adjacent ones of the plurality of syringe bodies.

5. An apparatus as recited in Claim 1, wherein said plurality of syringe bodies are aligned side-by-side, series relation in said predetermined orientation.

20

6. An apparatus as recited in Claim 5, wherein at least the barrels of the plurality of syringe bodies are of a common length, and wherein the belt is fixedly connected to the barrels along a common portion of the length of each.

7. An apparatus as recited in Claim 5, wherein said belt is of a width that exceeds a majority of a length of each of the barrels comprising said plurality of syringe bodies.

8. An apparatus as recited in Claim 1, wherein said belt is of a pliable construction.

9. An apparatus as recited in Claim 8, wherein said belt comprises:

opposing layers adjoined in face-to-face relation between adjacent ones of said plurality of syringe bodies and wrapped about opposing sides of the barrels of each of said plurality of syringe bodies.

10. An apparatus as recited in Claim 9, wherein at least one of said opposing layers is
5 substantially transparent.

11. An apparatus as recited in Claim 10, wherein said opposing layers are adhesively adjoined, and wherein at least one of the opposing layers is adhesively connected to the barrels of the plurality of syringe bodies.

12. An apparatus as recited in Claim 1, wherein said belt is of a severable
construction.

13. An apparatus as recited in Claim 12, wherein said belt is of a predetermined length between adjacent ones of said plurality of syringe bodies, said predetermined length being sufficient to define label flaps upon severance of the belt between said adjacent ones of the plurality of syringe bodies.

14. An apparatus as recited in Claim 13, wherein said flaps are of predetermined length being sufficient for the placement of contents information thereupon.

15. An apparatus as recited in Claim 1, wherein said belt comprises:
a first portion extending between adjacent ones of said plurality of syringe bodies; and,
a second portion that extends about at least a portion of the barrels of each of said
20 plurality of syringe bodies.

16. An apparatus as recited in Claim 15, wherein at least said second portion of said belt is substantially transparent.

17. An apparatus as recited in Claim 1, wherein each of the barrels of the plurality of
syringe bodies includes a dispensing end and an opposing end, and wherein each of said plurality
of syringe bodies further comprises:

a cap removably disposed on the dispensing end of the barrel; and

5 a plunger slidably disposed in the opposing end of the barrel.

18. An apparatus as recited in Claim 17, wherein for each of said plurality of syringe
bodies:

the dispensing end of barrel includes a fluid port and an outer flange; and,

10 the caps includes an outer member matingly positionable within the outer flange of the
barrel and an inner member matingly positionable about the fluid port of the barrel.

19. An apparatus as recited in Claim 17, wherein for each of said plurality of syringe
bodies:

the dispensing end of the barrel includes a fluid port and an outer flange; and,

15 the cap includes an outer member matingly positionable about the outer flange of the
barrel and an inner member matingly positionable within the fluid port of the barrel.

5 orientation.

21. A method as recited in Claim 20, further comprising:

locating said plurality of syringe bodies in a plurality of holders for at least one production operation.

22. A method as recited in Claim 21, wherein said belt defines a predetermined spacing between adjacent ones of said plurality of syringe bodies, and wherein said plurality of holders are separated by a distance corresponding with said predetermined spacing.

23. A method as recited in Claim 21, further comprising:
moving said plurality of holders along a predetermined path during said at least one production operation.

24. An assembly as recited in Claim 23, said belt being of a pliable construction, and said locating step comprising:

successively suspending adjacent ones of said plurality of syringe bodies to dispose said adjacent ones in aligned positions for receipt by said plurality of holders, wherein said adjacent ones are successively located in said plurality of holders during said moving step.

20 25. A method as recited in Claim 23, wherein said plurality of holders are located on a support member, and wherein said moving step comprises:
rotating said support member.

26. A method as recited in Claim 23, wherein a plurality of work locations are located along said predetermined path, and wherein the method further comprises:

disposing said plurality of syringe bodies in series at said plurality of work locations to complete said at least one production operation.

5 27. A method as recited in Claim 26, wherein for each of said plurality of syringe bodies said disposing step comprises:

first locating the syringe body at a first work location;
second locating the syringe body at a second work location; and,
returning said one the syringe body to the first work location.

10 28. A method as recited in Claim 21, wherein said at least one production operation comprises at least one of the following:

filling said plurality of syringe bodies with a predetermined fluid;
removing and replacing on caps from each of said plurality of syringe bodies; and
labeling said plurality of syringe bodies to indicate the contents thereof.

15 29. A method as recited in Claim 21, further comprising:

packaging said plurality of interconnected syringe bodies and in a container prior to said locating step; and,

unpackaging said plurality of syringe bodies from said container prior to said locating step.

20 30. A method as recited in Claim 29, further comprising:

sterilizing said plurality of interconnected syringe bodies after said packaging step and prior to said unpackaging step.

31. A method as recited in Claim 21, wherein said plurality of holders are disposed to position adjacent ones of said plurality of syringe bodies in side-by-side relation.

32. A method as recited in Claim 31 further comprising:

separating said plurality of interconnected syringe bodies.

10
20
30
40
50
60
70
80
90
100

33. An apparatus for handling a plurality of syringe bodies interconnected in series by a belt in a predetermined orientation with a predetermined spacing therebetween, comprising:
a plurality of holders for holding said plurality of syringe bodies, said plurality of holders being separated by a distance corresponding with said predetermined spacing; and,

5 a driven support member for moving said plurality of holders along a predetermined path.

34. An apparatus as recited in Claim 33, wherein said plurality of holders hold adjacent ones of said plurality of syringe bodies in substantially parallel relation with dispensing and opposing ends thereof extending outwardly relative to said predetermined path.

35. An apparatus as recited in Claim 33, further comprising:

at least one work station having a support member disposed to move towards and away from the dispensing ends of said plurality of syringe bodies.

36. An apparatus as recited in Claim 35, said at least one work station being provided for at least one of the following:

automated fluid filling of said plurality of syringe bodies; and,

automated removal and replacement of caps on said dispensing ends of the plurality of syringe bodies.

37. An apparatus as recited in Claim 33, further comprising:

at least one work station having a support member disposed to move towards and away

20 from an outward facing surface of said belt.

38. A method as recited in Claim 37, said at least one work station being provided for at least one of the following:

automated cutting of said belt between adjacent ones of said plurality of syringe bodies; and,

automated printing of contents information in relation to each of said plurality of syringe bodies.

39. An apparatus as recited in Claim 33, wherein said driven support member comprises:

a rotatable member having said plurality of holders mounted about the periphery

5 thereof.

40. A method for filling a plurality of syringe bodies, wherein for each syringe body the method comprises:

holding the syringe body in at least one holder;

removing a cap from a dispensing end of the syringe body during said holding step;

5 filling the syringe body at the dispensing end thereof during said holding step; and, replacing said cap on the dispensing end of the syringe body during said holding step.

41. A method as recited in Claim 40, wherein for each syringe body the method further comprises:

placing said cap on said dispensing end of the syringe body prior to said holding step.

10 42. A method as recited in Claim 41, wherein for each syringe body the method further comprises:

packaging said syringe body in a container after said placing step and prior said holding step; and,

unpackaging said syringe body from said container prior to said holding step.

15 43. A method as recited in Claim 42, wherein for each syringe body the method further comprises:

sterilizing the syringe body after said packaging step and prior to said unpackaging step.

44. A method as recited in Claim 40, further comprising;

interconnecting a belt to said plurality of syringe bodies in a predetermined orientation.

20 45. A method as recited in Claim 40, wherein for each syringe body the removing and replacing steps each include:

retainably engaging said cap in a retainer; and,

moving at least one of said retainer and said holder to affect relative movement between the cap and the dispensing end of the syringe body.

46. A method as recited in Claim 45, wherein for each syringe body the retainably engaging step comprises:

moving said holder along a predetermined path to insert the cap into the retainer.

47. A method as recited in Claim 45, wherein for each syringe body the filling step
5 comprises:

interconnecting a fluid supply member with a dispensing end of the syringe body; and, flowing fluid into the syringe body through the interconnected fluid supply member and dispensing end of the syringe body.

48. A method as recited in Claim 47, wherein for each syringe body, said removing, filling and placing steps are completed at a first location of the syringe body.

49. A method as recited in Claim 48, wherein for each syringe body, said retainer and said fluid supply nozzle are interconnected for tandem movement during said removing, filling and replacing steps.

50. A method as recited in Claim 47, wherein for each syringe body the method further comprises:

first locating the syringe body at a first location for completion of said removing step; second locating the syringe body at a second location for completion of said filling step; and,

returning the syringe body to said first location for completion of said replacing step.

20 51. A method as recited in Claim 47, wherein for each syringe body the filling step further comprises:

sensing the position of a plunger end thereof, said position being indicative of an amount of said fluid within said syringe body.

52. A method as recited in Claim 47, wherein said flowing step comprises at least one of the following:

injecting said fluid into the syringe body under pressure; and,

drawing said fluid into said syringe body by retraction of a plunger comprising the

5 syringe body.

100 100 100 100 100 100 100 100 100 100

53. An apparatus for filling a plurality of syringe bodies, comprising:
at least one holder for holding at least one syringe body in a predetermined orientation;
a retainer for retainably engaging a cap located at a dispensing end of a syringe
body, wherein said cap may be selectively removed and replaced by said retainer; and,
5 a fluid supply member disposed for selective fluid interconnection with a dispensing end
of a syringe body.

54. An apparatus as recited in Claim 53, further comprising:
a driven support member for selectively moving at least one of said retainer and said fluid
supply member towards and away from a dispensing end of a syringe body.

55. An apparatus as recited in Claim 54, wherein said driven support member is
interconnected to both the retainer and fluid supply member for tandem embodiment according
to one of a U-shaped motion pattern and a linear motion pattern.

56. An apparatus as recited in Claim 53, further comprising:
a driven support member for moving said at least one holder along a predetermined path.

57. An apparatus as recited in Claim 56, wherein said retainer and fluid supply
members are located on a common side of said predetermined path.

58. An apparatus as recited in Claim 53, further comprising:
a first retention member for retaining a barrel of a syringe body; and
a second retention member for retaining a plunger of a syringe body, wherein said first
20 and second retention members are disposed for driven relative movement therebetween.

59. An apparatus as recited in Claim 53, further comprising:
a sensor for sensing the position of a plunger with a barrel of a syringe body.

60. A method for labeling a plurality of syringe bodies, comprising:
interconnecting a belt to a plurality of a syringe bodies in a predetermined orientation;
placing contents-related information on an interconnected belt segment for each
given one of said plurality of syringe bodies; and separating said belt between each of said
5 plurality of syringe bodies to define an interconnected flap on each of said plurality of syringe
bodies.

61. A method as recited in Claim 60, wherein said belt is of a pliable construction,
and wherein said separating step comprises:

severing said belt between adjacent ones of said plurality of syringe bodies.

62. A method as recited in Claim 61, wherein for each of said plurality of syringe
bodies said placing step comprises:

printing said contents-related information on a label; and,
affixing said label to said interconnected belt segment.

63. A method as recited in Claim 60, wherein for each said plurality of syringe bodies
said placing step comprises:

printing said contents-related information directly on said interconnected belt segment.

64. A method as recited in Claim 60, wherein said contents-related information
comprises at least one of the following:

information regarding a type of fluid contained in the syringe body;
20 information regarding an amount of a fluid contained in the syringe body;
information regarding a fill date for the contents of the syringe body; and,
information regarding handling and storage instructions for the syringe body.

65. A method as recited in Claim 63, wherein at least a portion of said contents-
related information is bar coded.

66. A method a recited in Claim 60, wherein said method further comprises:

packaging said plurality of syringe bodies in a container after said interconnecting step
and prior to said separating and placing steps; and,

unpackaging said plurality of syringe bodies from said container prior to said separating

5 and placing steps.

67. A method as recited in Claim 66, further comprising:

sterilizing said plurality of syringe bodies after to said packaging step.

68. A method as recited in Claim 60 wherein said interconnecting step comprises:

attaching at least one continuous layer of a pliable material between and about at least a portion of each of said plurality of syringe bodies.

69. A method as recited in Claim 68, wherein said at least one continuous layer is substantially transparent.

10
11
12
13
14
15
16
17
18
19
20

70. An apparatus for labeling a plurality of syringe bodies interconnected in series by a belt, comprising:

 a plurality of holders for holding said plurality of syringe bodies; and,

 a separation member for separating said belt between adjacent ones of said plurality of syringe bodies to define an interconnected flap on each of the plurality of syringe bodies; and,

5 a labeling member for placing contents-related information on an interconnected belt segment for each given one of said plurality of syringe bodies.

71. An apparatus as recited in Claim 70, wherein said belt defines a predetermined spacing between adjacent ones of said plurality of syringe bodies, and wherein said plurality of holders are separated by a distance corresponding with said predetermined spacing.

72. An apparatus as recited in Claim 70, further comprising:

 a driven support member for moving at least one of said separation member and said labeling member towards and away from said plurality of holders.

73. An apparatus as recited in Claim 70, further comprising:

 first and second driven support members for separately moving said separation member and said labeling member towards and away from said plurality of holders, respectively.

74. An apparatus as recited in Claim 70, further comprising:

 a driven support member for moving said plurality of holders along a predetermined path.

75. An apparatus as recited in Claim 74 wherein said driven support member comprises:

20 a rotatable member.

76. An apparatus as recited in Claim 74, wherein said separation member and said labeling member are disposed for sequential operation along said predetermined path.

77. An apparatus as recited in Claim 70, further comprising:

a processor for storing and providing said contents-related information to said labeling member.

78. An apparatus as recited in Claim 70, wherein said labeling member comprises:

5 a printer for printing said contents-related information on one of labels and said belt segments.

10
15
20
25
30
35